

## Towards a Center for Science Technology Engineering and Math Education

The National Academies' *Rising Above the Gathering Storm* report calls for four avenues of action to support U.S. science, technology, engineering and mathematics (STEM) competitiveness for the coming century; these are, in priority order, to “focus on actions in K–12 education (10,000 Teachers, 10 Million Minds), research (Sowing the Seeds), higher education (Best and Brightest), and economic policy (Incentives for Innovation).”<sup>1</sup> Research universities are poised to directly address the first three of these areas, and to indirectly influence the fourth. The University of Colorado at Boulder (CU Boulder) is particularly well poised to take direct and immediate action on these issues through integrating three currently existing lines of NSF-supported work: (1) undergraduate and graduate course transformation, (2) undergraduate and graduate teacher preparation, and (3) discipline-based education research among faculty, students, and post-doctoral scholars. Notably, each of these three lines of inquiry into STEM education supports the other two. One of the distinctive aspects of these multi-disciplinary efforts at CU Boulder is that they are located largely in the disciplinary and education departments, rather than in an external center or department. This I<sup>3</sup> effort will lead to a *distributed* Center of STEM education research and transformation that will: (a) integrate the three lines of inquiry and development described above, (b) retain the status and rigor offered through science and engineering departmental identity, and (c) expand the reach of thriving STEM education community to include more departments and participants. The proposed five year I<sup>3</sup> program is designed to help establish CU Boulder as a national hub of STEM Education by broadening participation, bridging critical educational junctures, developing a better prepared workforce, integrating discipline-specific education and research, and to do so in the context of a sustainable model of institutional practice which integrates multiple efforts in STEM education.

Two scales of activity will occur: i) the building of particular STEM education activities and community infrastructure, under the primary supervision of a Project Management Team, composed of faculty spanning the schools of Arts and Sciences, Education, and Engineering, and ii) the building of institutional infrastructure and sustainable models of support, through joint efforts of the Principal Investigators, composed of the university Provost, and Deans of from the three schools, with the project management team.

**The intellectual merit** of this endeavor lies in the support and growth of the university commitment to and success in STEM educational transformation and education research. This five year program employs innovative approaches to synthesizing and growing commitment to STEM education by supporting participants in discipline-specific educational research and transformation within the home departments, while creating an interdisciplinary community of scholars dedicated to research-based educational improvement. The distributed center will capitalize on physical, social, and cyber infrastructure to build and sustain a University-wide model for science education research and effective practice.

**The broader impact** of this I<sup>3</sup> program is the national impact of the resultant Center's research-based, tested, and disseminated innovations in STEM educational practice. This effort will capitalize on the synergies of existing STEM education efforts at CU Boulder, which have already: produced dramatic increases in the numbers of students engaging in STEM teaching (K12 to college), transformed research-based educational practices in undergraduate STEM courses, and seeded the growth of new fields of STEM discipline-based education research. This I<sup>3</sup> program will provide a model for other research universities seeking to leverage modest resources to integrate synergistic projects on their campuses.